

## Appendix A-3

**Sukaskas, Joe**

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**From:** Johnson, Eric [ejohnson@iso-ne.com]  
**Sent:** Tuesday, May 03, 2005 5:33 PM  
**To:** Sukaskas, Joe  
**Subject:** Maine study  
**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Joe:

We are reviewing the draft report specifically with respect to sections on cyber security and the role we play. I would intend to provide specific language to address this point as Chuck Cohen requested; and I would submit that to you in writing.

Additionally, I have some general suggestions for edits that perhaps we could discuss by phone at a time when you could mark up a printed copy. I would provide red-line changes, but I only have a PDF version. I will be at the Planning Advisory Committee meeting on Wednesday, but you can page me and I will call you back to discuss.

Thank you.

**Eric D. Johnson**

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6/16/2005

**Sukaskas, Joe**

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**From:** Johnson, Eric [ejohnson@iso-ne.com]  
**Sent:** Wednesday, May 11, 2005 4:49 PM  
**To:** Sukaskas, Joe  
**Subject:** ME grid study  
**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Joe:

I am attaching a redlined version of the draft grid study. Page numbers refer to the attachment, not the original page numbers.

Overview of comments:

- Update terminology (e.g. NEPOOL Operating Procedures are now ISO-NE Operating Procedures);
- Include a section on the regional system plan (RSP, f/k/a RTEP) beginning on page 13, including information on how to get the report; we request that the ISO CELT map be removed from the attachments along with the reference to it in the report on page 14;
- There is a reference on page 83 to rotating blackouts that you may want to verify with the local utilities. (ISO makes the determination of the amount of load that may need to be disconnected, but we do not specify the precise locations.)
- Include a section on the audit process governing cyber security; we also request that the comment on page 99 stating that "no effective enforcement mechanisms are in place" be struck. The audit language is inserted at page 89 is intended to explain ISO's role in cyber security.

We appreciate the opportunity to present these items for your consideration.

Overall, we believe this is a good report; the legislature should be well-served by its findings and analysis.

Please contact me if you have any questions.

Thank you.

**Eric D. Johnson**

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<<2004-248 grid-reliability-report (EJ) (2).doc>>

6/16/2005

**Sukaskas, Joe**

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**From:** Johnson, Eric [ejohnson@iso-ne.com]  
**Sent:** Thursday, May 12, 2005 2:46 PM  
**To:** Sukaskas, Joe  
**Subject:** 1 in 10 yr. std.

Joe:

The relevant ISO-NE and NPCC documents are as follows. I am checking on the map.

Eric

The NPCC Basic Criteria for Design and Operation Of Interconnected Power Systems can be found here:

<http://www.npcc.org/PublicFiles/Reliability/CriteriaGuidesProcedures/A-02.pdf>

The Resource Adequacy Design Criteria is under Section 3.0.

The New England Planning Procedure can be also found here:

[http://www.iso-ne.com/ISO\\_new\\_england\\_planning\\_procedures/PP3\\_R2.doc](http://www.iso-ne.com/ISO_new_england_planning_procedures/PP3_R2.doc)

The reliability standard for resource adequacy is under Section 2.0.

6/16/2005

## Appendix A-4

## COMMENTS ON DOCKET 248

To Ralph Howe:

Thank you for thinking of me. I was involved with the distribution circuit outage/reliability conditions at CMP and I am encouraged that the Legislature took an interest in electric utility distribution systems throughout the state since the deregulation of the industry.

I have read the report and generally agree with the findings. I will pass along some of my thoughts.

### GRID

My first comment is on the use of the term "GRID". I always associate the term grid with the transmission system. It acts like a grid in that substations are fed off transmission lines, which usually provide a second feed to the substation. Because the transmission grid allows substations to have a second feed either automatically or by the system dispatcher, substations have a much shorter duration of outages and a greater degree of reliability. Since transmission lines are built on maintained right of ways, their reliability is on a different level than distribution circuits. Distribution circuits are always radial with little or no backup capability. What few circuits that do 'tie' together with another circuit, have very limited capacity and can only do so under limited times and any switching has to be done manually.

I always use the term 'grid' when referring to the transmission system. I refer to the collection of distribution circuits as the 'distribution system'. To put it in perspective, CMP has about 20,000 miles of distribution circuits, mostly roadside, and only 2400 miles of transmission lines operating on cleared and maintained right of ways.

I only mention this as I believe this report may be reviewed by people without an electric utility background, and this distinction is very important to their understanding of reliability issues. The use of 'grid' when referring to the distribution system gives the public a misconception when discussing reliability. I would only use grid when talking about the transmission system.

### SUBSTATION & TRANSMISSION

A comment on these two systems are that these areas involve bulk power that historically required greater reliability because of the impact that any failures would cause. The substations have always benefited from high profile maintenance programs. The only weak area is surprisingly in animal contacts. Although it may seem trivial, there are locations in substations where equipment would benefit from the use of animal guards or review substations for locations where animal contact is possible.

The transmission systems are the backbone of the national electric grid. In the deregulation process it is imperative that they remain with the local utilities maintained by the "owner in the store" principal. As the transmission system ages local support should come to company maintaining the system. It is an area where Federal intervention should be minimal. Therefore, the standards now in place can enforce the reliability but without the generation portion, utilities are hard pressed to do large scale T-line rebuilds or upgrades. This is an area where the MPUC should take part in by monitoring the industry trends. The owners of the generation plants didn't/don't have the necessary controls to be responsive to the local distribution companies. Any lack of funding on transmission lines that result in a degrading of reliability would risk federal intervention. Somehow states and regions should be allowed to maintain these functions with only a minimal amount of intervention from Washington. Allow the industry professionals who design, build and maintain the transmission lines to operate them with necessary funding before political interests intervene. Give the utilities the needed money to maintain the lines as they have been rather than waiting until it is a huge problem. Maintenance funding should continue but also there should be projects to upgrade certain line capacity as the load increases. I am not sure how expensive upgrades of transmission lines is being handled.

### UNDERGROUND

I am glad that there was no mention of underground lines when discussing reliability. Underground is certainly much more reliable as long as redundancy is built in. To underground a system would be too expensive and too technical. All distribution circuits technically can be put underground but the cost would be prohibitive. Maintenance of the system also would be too expensive.

### DISTRIBUTION RELIABILITY

If one looks at the causes of outages on the distribution system, it is apparent that trees and tree related conditions are the overwhelming factors.

The indices of SAIFI & CAIDI along with other industry reliability ratings can be used to analyze distribution outages. The MPUC has an understanding of how these indices work. In the future there will have to be changes to reflect where and which trouble areas need attention. The point I would make is that the distribution circuits are always expanding. Any new residential housing or commercial businesses that come on line, come onto the distribution system. As people move out into the suburbs or country, new loads are being added to the circuits further out on the circuits, i.e. further away from the substation source. The nature of distribution circuits is that the beginning part of the circuit or the three phase has the most customer and load density and also the best trimming and therefore is most reliable. With substations usually

located near urban areas, the three phase is usually in urban areas where the roadway requirements result in fewer tree conditions, hence the greater reliability.

With so many new services coming farther out on circuits, the exposure to tree related outages increases on the parts of the circuits that are the most complex. The application of protective devices to isolate outages to a small area becomes very difficult to maintain. The use of recloser-fuse protection schemes is limited as the single-phase portions of the circuits expand. As the prime rural land is being developed, many new houses are being built on back-acreage with long driveways. These services require a section or two of primary line (on private property) because a secondary run would cause low voltage. Primary lines are more susceptible to tree contact problems than secondary lines. With so many new services coming 'off the paved roads' future reliability will be further eroded. When a new line extension is approved and energized, the line clearances (from trees) are to standards. Within 5 years these lines will be in need of trimming. Unfortunately the single-phase lines (where all the growth is coming) are the last to get cyclic trimming. Usually the budgeted trimming money runs out before all the single phase lines are trimmed. Today on these so-called 'camp lines' are where more and more people have been building permanent homes and these lines have the worst trimming conditions. Usually built on right-of-ways or along dirt camp roads, these lines are where the most outages occur and take the longest to restore. Because they are often only a few customers on a small segment of line, they are still recorded as one outage with a small number of 'customer-hours' of outage.

My concern is the single-phase lines have always been the cause for the majority of outages (and with the longest durations). Whatever level of reliability exists today will only get much worse as more line attachments and extensions are added onto the worst part of the distribution system. The number of outages will increase but customer-hours (of outages) may not increase significantly.

Any review of reliability standards or indices will have to acknowledge that total outages are destined to increase as the system expands. That is the penalty for growth in this state. With no new transmission lines being planned, distribution customers will never get 'closer to a substation' and see better reliability.

#### **LINE CLEARANCE**

Line clearance or 'trimming' is a very slow manual procedure that requires the worker to be in very close proximity to the energized line. In reality if trimming were done on de-energized lines, it would be faster and less costly but these planned outages might not be tolerated by customers. This is a more effective way of spending trimming dollars but would have a limited practice without a better understanding of the options. This is one area that could be investigated and encouraged.

In reviewing any distribution circuit there are still many line sections that are just 'woods' where large mature trees could be taken down or harvested (for fire-wood) and once removed would never cause any further outages. Trimming is often described by lineworkers as 'snip-snip', meaning it is a lot of work for only a temporary effect. When a complete tree is removed it eliminates maybe 20-30 years of future outages or trimming attention. It is unfortunate that more of these trees couldn't be eliminated and in many of these locations line clearance distances increased. The 'hazard tree' program was started to get some of these end-of-life trees. It is an effective way to eliminate repeat problem trees and should be continued and encouraged.

There are many areas where either the town or state would benefit from eliminating large trees. The MDOT knows that in many road locations large trees result in icy conditions because the trees block out the sun in the winter. When an automobile leaves the road it has a lesser impact if it hits smaller trees or brush but is often a fatal if a large tree is hit. Road safety would be increased if these areas could be opened up. The trend by the public towards driving faster on secondary roads only begs for less potential obstructions. With road right of way widths probably not likely to be increased, removal of certain large (end-of-life) trees would have a tremendous impact of road safety. The towns would endorse a more open road environment for safety especially for school bus routes as would highway safety officials.

Is it solely the responsibility of CMP? What should take place is an effort between CMP (or the local utility), local towns and the MDOT to begin an understanding of the situation. I have heard MDOT engineer John Dorrity describe roads as 'transmission corridors'; meaning the road right-of-way today has to transmit electricity, phone and cable service, people, school buses, trucks and fire and rescue vehicles and should be viewed as a vital necessity. CMP always takes the heat for being the bad-guy for having to get trimming permission from every abutter, but other utilities and the local towns and MDOT are the beneficiaries of a more open corridor. The MPUC should look at ways to share the cost of roadway R/W maintenance with other users. An example is cable/internet companies are gaining more customers, up-grading services and increasing revenues while paying nothing towards corridor upkeep. It is all a freebie thanks to CMP. In light of utility restructuring, there should be fees for being in and using the roadway R/W. While this might be beyond the domain of the MPUC, this is the time to open up the problem with other Maine officials. Maine continues to attract new cottage businesses in rural areas where reliable electric service is essential but with the increasing cost of the energy portion of electricity, the distribution portion is seriously being squeezed.

If more money doesn't go to maintaining the distribution system, the reliability cannot increase because the system is getting larger with no increase in maintenance funding.

Towns are also facing increased demands on their road systems. Road corridors should be viewed in a new perspective. Efforts to look for ways for all utilities to share responsibilities, has to start in Augusta. The MPUC would be

the obvious group to advance this issue. This issue is outside the report but is mentioned here as an area to be considered in the future.

### **AGE of PLANT**

I agree an overlooked condition is the age of the pole and wire plant with all Maine utilities. This is of concern with all electric utilities across the country. I used to tell people that transformers and wire are metal and have a long life span. Transformers fail at end-of-life and are replaced then. Wires break when subjected to abnormal conditions like ice and trees, and are fixed by being spliced together and put back in service. Poles were dead when they were set into the ground and spend their years continuing to rot, only being replaced when they break or need to be taller. Most utilities don't have a program to identify the oldest poles and replace them before they fail. It is very expensive and a low priority, however, every year the plant does get OLDER. There should be a program to keep the old plant from increasing. First it has to be identified. The MPUC should see how many 40+ years old poles are in service and work with utilities to agree on maximum age of plant. It is an area where there should be a program of replacing a certain number of old poles every year to avoid another huge problem that will be impossible to fix overnight. The inspection program is the best way to pick up these poles. In the past the problem was after the inspection was done and problems found, many of the problems were never corrected. With an inspection program goes replacement.

### **BETTERMENT**

Most utilities have plant betterments where selected lines are replaced and up-graded. These projects are very expensive and are usually directed toward improving the electric capacity to serve the circuit loading. With a high cost and only a small increase in reliability as a benefit it is an area where utilities are falling behind. This can be compared to a road or highway upgrade where the cost is high but only a small segment is affected. CMP used to be a winter-peaking company but now with less electric heat usage and more air conditioning loads, the peak loads are often in the summer. Overloaded wires in the winter benefit from a cold ambient temperature, but summer loads during hot temperature periods of the day result in much reduced ratings on wire loading.

### **RELIABILITY**

Reliability unfortunately is very expensive to increase and so dependent on the weather; this was the reason for the exclusion. No utility could pay to have huge line crews available for the few weather related extended outages. The cost to improve reliability toward 100% is certainly exponential. The challenge is to put the limited budget dollars where they are best spent. I think CMP has done an exceptional job over the years keeping the distribution system in top-shape while battling for corporate dollars with major capital improvements in transmission lines and generating plants that seemed to be more important and critical. After deregulation with reduced capital there are few new transmission lines being built but new distribution customers come on-line every day. I remember an old time lineworker saying "We drop everything we are doing to bring on a new customer who has never paid us a cent, while all the folks who pay their bills every month don't get anything attention." While the line extension policy today recovers more up-front costs, the concern about maintenance is still a huge concern for the future. What the PUC will find is the same as CMP has found out before; the customer will determine what level of reliability it will tolerate. After the '98 Ice Storm there were many people who put in emergency generators. How many since have gone in? Probably very few. People are generally satisfied with their electric service and if questioned probably wouldn't want better service if it cost them anymore money every month.

My biggest concern is not so much reliability numbers; they are a good way to monitor service, but I think there should be an increased level of annual budgeting to upgrade distribution plant, but I realize it must be justified. If customers are satisfied with their level of service it is hard to increase the maintenance budget. Spending money on trimming maintains reliability and certainly provides a very stable tree trimming industry. In a perfect world there would be no trees adjacent to distribution lines for maximum reliability. Cleared right-of-ways are possible and required for transmission lines. What can be done to evolve a distribution system towards a transmission system for increased reliability? A fact is that "if there were no trees there would be very few outages".

### **CIRCUIT ANALYSIS**

The MPUC's concerns on inspection programs are valid, but once conditions are identified they should be remedied. Agreement is needed on what conditions take highest priority. It still gets back to spending money on the major parts of the system versus small widespread areas. Impacting several thousand customers versus several hundred has always been the tough call. Any one customer, in any part of the system may become the MPUC's prime focus and there has to be a weighting of the concern. As always the customer on the more remote areas of the systems will always be the hardest to satisfy. Large dollars in effort will be required at the expense of other areas of need. In reality each distribution circuit needs to be broken down to reflect a diminishing reliability as one gets farther from the substation. Some circuits will always be very, very long with many branches and money would not be well spent for the number of customers served. Questions always asked are, Are all customers equal or Who then is a second-rate customer.

Unfortunately what needs to be established is a way that customers on the extremities can be made to understand that they cannot expect the same quality as those in the urban portions of the circuits. Zones of circuits could be compared and within a circuit, lesser reliability levels established to further identify and compare circuits. What this means is that not all circuits are equal and not all parts of the circuit are the same. The next step is to develop comparisons (by number of



customers and miles of line exposure) within like circuits and between circuits. These zones would reflect like conditions between circuits, which would then be compared to applicable reliability levels. In effect, of all the trouble areas, where should money get spent most effectively. I know that CMP would be encouraged if the MPUC were involved to try and understand how money SHOULD be directed to eliminate the 'squeaky-wheel' syndrome. There will always be limited resources in manpower and money and the best use of both is difficult when the public is involved. A better understanding between the MPUC and electric utilities is the next step in furthering the reliability problem. The 'Worst circuit' comparison was a first step that I started to show that some circuits had many more outages than others. The next step is to break down single-phase portions of circuits and set up guidelines to compare where the worst segments of circuits are.

The existing indices give an overall assessment of reliability, but for the future there needs to be a process to identify which parts of a circuit have the most problems and compare this segment/s to all of the segments on all of the other circuits while factoring in customer density, loading and growth. This would insure that existing levels of maintenance budgeting would be directed at the right areas.

These are some of the issues that can be considered for further study to better circuit reliability. Some I haven't discussed.

- ❖ Reduce the trees adjacent to distribution lines; greater education on planting new trees where they can grow into contact with distribution lines; customer tree replacement program
- ❖ Remove critical trees through more aggressive cutting with the backing of MDOT & MPUC for the good of the roadway
- ❖ Work with towns to educate officials to the benefits to the town of removing trees and ways to accomplish it
- ❖ Require other utilities who use the 'utility corridor' to contribute to the maintenance; it is a 'state and town corridor'
- ❖ Realize that the distribution circuits are always getting longer and increasing the exposure to outages; without added funding, Indices will have to be eased/loosened or weighted (maybe customer-hours of outage are more important than number of outages)
- ❖ Require that utilities identify oldest plant and begin routine up-grade simply on 'age-of-plant'
- ❖ Question the utilities on programs of reducing the response time by identifying circuit outage location from customer calls and prioritizing restorations via maps
- ❖ Develop reliabilities and indices within circuits so that parts of circuits or zones can be compared across the system
- ❖ Expand 'Worst Circuits' by comparing different circuit characteristics and establish different levels of reliabilities

I have rambled on enough. Thanks for listening. This report is a very honest and fair appraisal of the 'post-deregulation' utilities. I commend the MPUC and hope this opens a new era in relations between utilities and the regulators.

Thanks,  
Arthur Ray, PE